

MANAGEMENT OF POSTOPERATIVE PAIN AFTER T6 CORPECTOMY: USE OF EPIDURAL BUPIVACAINE AND SUFENTANIL—A CASE REPORT

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The objective of this case report is to discuss the successful postoperative analgesic management in a patient who had disseminated rectal cancer pain and failed to obtain pain relief despite high-dose intravenous hydromorphone.

A 45-year-old male had metastatic rectal cancer involving multiple vertebrae. After a T6 corpectomy, the patient failed to obtain effective pain relief with massive doses of parenteral opioids. The epidural catheter was placed under fluoroscopy. The patient subsequently failed to obtain relief with epidural administration of bupivacaine

and hydromorphone. Epidural sufentanil was used to obtain adequate pain control.

Postoperative epidural analgesia is a technique worthy of consideration for patients with extreme opioid dependency for corpectomy. Epidural sufentanil can successfully be administered for postoperative pain control for patients receiving a large dose of opioids for cancer pain.

Key words: Cancer pain, epidural, postoperative analgesia, sufentanil.

Compression of the spinal cord by metastatic tumor is a common neurologic complication of advanced tumor.¹ Cancer patients with chronic pain usually require a large dose of opioids because of the disease progression. Patients using a high dose of opioids may require surgery. Postoperative pain control may be a challenge for the pain service. Patients who fail to obtain effective pain relief with oral or parenteral opioids often respond to the intrathecal or epidural administration of opioids.² However, some reports have indicated that patients on high doses of oral opioid may subsequently fail to obtain relief with spinal administration of opioid.^{3,4} These patients exhibit cross-tolerance between systemic and epidural morphine.⁵ Sufentanil appears to have a greater antinociceptive effect than does morphine.^{6,7} Sufentanil had been successfully used in opioid-tolerant patients who do not experience pain control despite a large dose of epidural morphine.⁸

This is a case report of a patient with metastatic rectal cancer involving multiple vertebrae. After a T6 corpectomy, the patient failed to obtain effective pain relief with massive doses of parenteral opioids. The epidural catheter was placed under fluoroscopy. The patient subsequently failed to obtain relief with epidural administration of bupivacaine and hydromorphone. Epidural sufentanil was used to obtain adequate pain control.

Case report

The patient was a 45-year-old white male with a his-

tory of metastatic rectal adenocarcinoma. In 1996, he was diagnosed with stage II rectal adenocarcinoma and underwent radiation, chemotherapy, and a colostomy. In the spring of 1999, the patient developed persistent pain in the lower extremities. A bone scintiscan revealed abnormal uptake at T6 and L3. The patient received radiation therapy for T6 and L3. In May 2000, an epidural catheter was placed for pain control; however, the catheter was later removed because of an infection. The pain was controlled with morphine sulfate controlled release (MS Contin) 300 mg 3 times a day and morphine sulfate immediate release for breakthrough pain. The patient was admitted to the hospital with progressive onset of bilateral weakness in the lower extremities, paresthesias, and spasticity. Magnetic resonance imaging revealed a T6 compression fracture with 40% height loss; canal compromise and cord compression; and T5, T7, L2, and L4 tumor involvement. The patient was admitted for surgical decompression

Under general anesthesia, the patient received a right thoracotomy, T6 corpectomy, arthrodesis of T6 corpectomy using SynMesh (Synthes, Chur, Switzerland) titanium cage, and an autograft with his resected rib. Anesthesia was maintained with 70% N₂O and 30% O₂; isoflurane, 0.7% to 1.2%; and a continuous intravenous (IV) infusion of fentanyl at 10 µg/kg per hour. Intraoperatively, he received a total of 110 mL fentanyl. The trachea was extubated, and the patient was transferred to the postanesthesia care unit. Upon arrival in

the postanesthesia care unit, the patient complained of excruciating pain in the operative site. The pain was not relieved by high dose IV fentanyl (10 mL) and morphine (10 mg). Hydromorphone (20 mg IV) was administered. Hydromorphone patient-controlled analgesia (PCA) was initially programmed with the following variables: basal rate, 4 mg/hr; bolus, 3 mg; and lock-out time, 10 minutes. Acetaminophen suppository was administered. The patient was transferred to the intensive care unit after some pain relief.

In the intensive care unit, the patient reported his right chest incision pain was 10 out of a possible 10 on the visual analog scale, and hydromorphone PCA was reprogrammed with the following variables: basal rate, 5 mg/hr; bolus, 5 mg; and lockout time, 10 minutes. A trial of epidural analgesia was begun based on the failure of parental analgesic modalities. A percutaneous epidural was placed at the T8-9 interspace by using the loss of resistance technique. The epidural catheter was advanced to T5 (past the T6 titanium cage) under fluoroscopy. Five mL of bupivacaine, 0.25%, with epinephrine, 1:200,000, was injected through the epidural catheter. T4 sensory block level was obtained. Epidural was infused with 0.15% bupivacaine and 0.1 mg/mL hydromorphone at a basal rate of 6 mL/hr. Hydromorphone continued via IV PCA, which was programmed with the following variables: basal rate, 0; bolus, 5 mg; and lockout time, 10 minutes.

After 12 hours of infusion, the patient reported that his pain was still 8 to 10 out of a possible 10 on the visual analog scale. A bolus of 50 mg sufentanil was administered epidurally. The pain was significantly relieved, and the patient reported his pain was 4 to 5 out of a possible 10 level. A lower extremities motor block was detected, and the bupivacaine concentration was reduced. An infusion of bupivacaine, 0.1%, with hydromorphone, 0.1 mg/mL, was continued at a rate of 6 mL/hr. Hydromorphone PCA was programmed with the following variables: basal rate, 1 mg/hr; bolus, 5 mg; and lockout time, 10 minutes. This resulted in adequate pain relief with no motor block and with no change in blood pressure. On postoperative day 7, the epidural catheter was removed. Adequate pain relief was obtained by IV PCA hydromorphone. On postoperative day 12, the patient was discharged with oral pain medication.

Discussion

Spinal epidural metastasis can cause severe neuropathic pain, which is difficult to treat with traditional analgesics.⁹ Patients who fail to obtain effective pain relief with oral or parenteral opioids often respond to the intrathecal or epidural administration of opioids.²

Previous spinal surgery has been considered to represent a relative contraindication to the use of regional anesthesia. Several postoperative anatomic changes make needle or catheter placement more difficult and complicated after spinal surgery.¹⁰ However, intraoperative surgical placement of the epidural catheter appears to be an elegant solution. It had been revealed that surgical placement of epidural catheters for postoperative epidural analgesia is a technique worthy of consideration.¹¹ The epidural catheter can be inserted through the ligamentum flavum under direct vision by the surgeon near the end of surgery.

Although the vertebral laminae, ligamenta flava, epidural space, and meninges are not directly involved in the corpectomy, intraoperative surgical placement of the epidural catheter was not the option in this case. Corpectomy was performed from the anterior approach, so access to epidural space was limited. Postoperative epidural analgesia became a reasonable option based on the failure of parental analgesic modalities.

Opioid tolerance is always a problem in the cancer patient. Desensitization or uncoupling of the receptor from the guanosine triphosphate-binding subunit decreases agonist binding affinity.⁸ The desensitization to agonist binding and the loss in number of receptors results in higher requirements.⁸ Switching to a different opioid or nonopioid, or coadministering opioid or nonopioid, has clinical potential and is supported by clinical studies.² In the present patient, we first switched to hydromorphone IV from which the patient received some pain relief. Coadministration of non-opioids had been considered. Ketorolac is not allowed to be administered in patients after spinal surgery.¹² In a retrospective study,¹² it had been demonstrated that ketorolac significantly inhibits spinal fusion at doses typically used for postoperative pain control. However, acetaminophen suppository was administered to potentiate the analgesic effect of the opioid.

Patients on very high doses of oral opioids may fail to obtain relief with spinal administration of opioid.^{3,4} Analgesia can be reestablished by substituting sufentanil for morphine in patients with extreme opioid dependency.^{7,8} Patients with high-dose oral morphine required postoperative pain control. All patients received an epidural bupivacaine/morphine infusion and IV PCA morphine postoperatively. If a visual analog scale of less than 4 out of a possible 10 was not achieved after 6 hours, sufentanil, 50 µg, was administered as an epidural bolus. Sufentanil's higher intrinsic efficacy appears to be related to its ability to exert an analgesic effect at a lower fractional receptor occupancy than morphine, as tolerance causes the population of total opioid receptors to decline.⁸ Although there are no

data about interactions between sufentanil and bupivacaine, it was speculated that sufentanil had a more pronounced synergistic interaction with bupivacaine than morphine.⁸ Neurotoxicity and myoclonic movement were major concerns with high dose sufentanil.¹³ It has been demonstrated that despite the presence of very high concentration of sufentanil in the white and gray matter of the spinal cord around the site of the epidural catheter tip, no evidence of histopathologic changes was noted.¹⁴

Conclusion

In conclusion, postoperative epidural analgesia is a technique worthy of consideration for patients with extreme opioid dependency for corpectomy. Epidural sufentanil can successfully be administered for postoperative pain control for patients receiving a large dose of opioids for cancer pain.

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